

REMARKS**I. General**

Claims 1-15 are pending in the application. Claims 3-5 and 13-15 stand rejected under 35 U.S.C. § 102. Claims 1-15 stand rejected under 35 U.S.C. § 103. Applicant respectfully traverses the rejections of record.

II. Claim Rejections under 35 U.S.C. § 102(b)

Claims 3-5 and 13-15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Pflugrath et al., United States patent number 5,722,412 (hereinafter *Pflugrath*). To anticipate a claim under 35 U.S.C. § 102, a reference must teach every element of the claim, see M.P.E.P. § 2131. Moreover, in order for a prior art reference to be anticipatory under 35 U.S.C. § 102 with respect to a claim, “[t]he elements must be arranged as required by the claim,” see M.P.E.P. § 2131, citing *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). The 35 U.S.C. § 102 rejection of record fails to establish a 35 U.S.C. § 102 rejection in accordance with the foregoing requirements.

Independent claim 3 recites “[a]n ultrasound system application specific integrated circuit (US-ASIC) having at least one beam former” The Examiner relies upon DSP ASIC 40 of *Pflugrath* to meet the claim (presumably because the Examiner is relying upon circuitry of this ASIC to meet other aspects of claim 3), Office Action at page 2. However, DSP ASIC 40 of *Pflugrath* does not include a beam former, see e.g., Figure 8 and column 9, lines 22-32. Instead, a different ASIC than the one relied upon in meeting the claim, FE ASIC 30 of *Pflugrath*, includes the beamformer thereof, see Figure 6 and column 6, lines 50-52. Nevertheless, the Examiner relies upon DELAY-SUM 320 of FE ASIC 30 to meet the recited beamformer. Clearly, DSP ASIC 40 is insufficient to anticipate the claim under 35 U.S.C. § 102.

The Examiner appears to recognize the foregoing deficiency in the applied art, asserting that “[a]ll ASIC functions of 20, 30, 40 and 50 may be combined within a single ASIC circuit board, see col. 1 lines 56-59,” Office Action at page 2 (emphasis added). Even assuming that the Examiner’s assertion is accurate, the limitation of the claim has not been

met. Placing multiple ASICs on a single circuit board does not result in DSP ASIC 40, relied upon by the Examiner to meet the claim, including a beamformer therein. Applicant respectfully reminds the Examiner that the last two letters of the acronym “ASIC” stand for “integrated circuit”. A circuit board having multiple components thereon, whether multiple ASICs or other discrete components, simply cannot anticipate a single ASIC under 35 U.S.C. § 102.

Accordingly, claim 3 and the claims dependent therefrom are patentable over the 35 U.S.C. § 102 rejections of record. Applicant requests that these 35 U.S.C. § 102 rejections be withdrawn.

Claims 4 and 5, dependent from base claim 1, also stand rejected as anticipated under 35 U.S.C. § 102 over *Pflugrath*, Office Action at pages 2 and 3. However, claim 1 is not rejected as anticipated by *Pflugrath*. 35 U.S.C. § 112, fourth paragraph, states that “[a] claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.” Accordingly, because anticipation of base claim 1 has not been established in the Office Action it follows *a fortiori* that the 35 U.S.C. § 102 rejection of record with respect to claims 4 and 5, which fails to establish that the limitations of base claim 1 are present in the applied art, is improper. Applicant presumes the rejection of these dependent claims as anticipated was a clerical error in the carrying forward of language from a previous Office Action. However, if the rejection of claims 4 and 5 is not merely a clerical error, Applicant respectfully solicits detail with respect to how these claims can properly be rejected as anticipated when the base claim is not.

III. Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-5, and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Pflugrath* in view of Knell et al., United States patent number 6,312,381 (hereinafter *Knell*), further in view of Olson, United States patent number 5,495,422 (hereinafter *Olson*), or Langford, II et al., United States patent number 5,115,435 (hereinafter *Langford*), further in view of Wang et al., United States patent number 6,135,961 (hereinafter *Wang*). Claims 2 and 7-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable

over *Pflugrath* in view of *Knell* further in view of Fazioli et al., United States patent number 6,527,722 (hereinafter *Fazioli*). Claims 3, 6, and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Pflugrath* in view of *Knell* further in view of Gilling, United States patent number 6,126,601 (hereinafter *Gilling*), alone or further in view of *Olson* or *Langford*.

To establish a *prima facie* case of obviousness, three basic criteria must be met, see M.P.E.P. § 2143. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Applicant respectfully asserts that the rejections of record do not meet the foregoing requirements. Accordingly, Applicant traverses the 35 U.S.C. § 103 rejections of record.

A. The Rejections Do Not Comport With Office Policy

“Patent examiners carry the responsibility of making sure that the standard of patentability enunciated by the Supreme Court and by the Congress is applied in each and every case.” M.P.E.P. § 2141 (emphasis in original). Further, “[o]ffice policy is to follow *Graham v. John Deere Co.* in the consideration and determination of obviousness under 35 U.S.C. 103,” M.P.E.P. § 2141.

Accordingly, when making a rejection under 35 U.S.C. § 103(a), M.P.E.P. § 706.02(j) directs the Examiner to set forth in the Office action: (1) the relevant teachings of the prior art relied upon; (2) the difference or differences in the claim over the applied references; (3) the proposed modification of the applied references necessary to arrive at the claimed subject matter; and (4) an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification. M.P.E.P. § 706.02(j) further points out that “[i]t is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply.” The Examiner has failed to satisfy the initial burden of establishing a proper rejection in accordance with the directives of the M.P.E.P. For

example, the 35 U.S.C. § 103 rejections of record do not provide an explanation why one of ordinary skill in the art would have been motivated to modify the references (see e.g., the discussion of *Pflugrath* in view of *Knell* at page 4 of the Office Action, the discussion of *Pflugrath*, *Knell*, and *Olson* in view of *Wang* at page 5 of the Office Action, the discussion of *Pflugrath* and *Knell* in view of *Langford* at page 5 of the Office Action, and the discussion of *Pflugrath* in view of *Olson* and *Langford* at page 8 of the Office Action wherein no statements of motivation for modification of the primary reference in light of the other references are provided).

Moreover, the claims stand rejected under a large number of alternative rejections in contravention to Office policy. For example, claim 3 stands rejected as follows:

1	35 U.S.C. § 102	<i>Pflugrath</i>
2	35 U.S.C. § 103	<i>Pflugrath</i> in view of <i>Knell</i> further in view of <i>Olson</i> and further in view of <i>Wang</i>
3	35 U.S.C. § 103	<i>Pflugrath</i> in view of <i>Knell</i> further in view of <i>Langford</i> and further in view of <i>Wang</i>
4	35 U.S.C. § 103	<i>Pflugrath</i> in view of <i>Knell</i> further in view of <i>Gilling</i>
5	35 U.S.C. § 103	<i>Pflugrath</i> in view of <i>Knell</i> further in view of <i>Gilling</i> and further in view of <i>Olson</i>
6	35 U.S.C. § 103	<i>Pflugrath</i> in view of <i>Knell</i> further in view of <i>Gilling</i> and further in view of <i>Langford</i>

As the above table illustrates, the present Office Action presents 6 alternative art rejections of claim 3 by applying 6 different references in a myriad of different ways. While Applicants appreciate the Examiner conducting a comprehensive search of the applicable art (in accordance with M.P.E.P. § 904.03), the Examiner is respectfully reminded that:

In selecting the references to be cited, the examiner should carefully compare

the references with one another and with the applicant's *disclosure* to avoid the citation of an unnecessary number. The examiner is not called upon to cite *all* references that may be available, but only the "best." (37 C.F.R. 1.104(c).) Multiplying references, any one of which is as good as, but no better than, the others, adds to the burden and cost of prosecution and should therefore be avoided. The examiner must fully consider all the prior art references cited in the application, including those cited by the applicant in a properly submitted Information Disclosure Statement. The best reference should always be the one used. M.P.E.P. § 904.03.

"Prior art rejections should ordinarily be confined strictly to the best available art." M.P.E.P. § 706.02. "Merely cumulative rejections . . . should be avoided." M.P.E.P. § 706.02. Also, M.P.E.P. § 707.07(g) directs that the "examiner ordinarily should reject each claim on all valid grounds available, avoiding, however, undue multiplication of references" (emphasis added). Given that the Office Action sets forth such a large number of alternative claim rejections, Applicants respectfully submit that the Office Action fails to set forth what the Examiner believes to be the best rejection(s).

B. The Rejections Over Pflugrath In View Of Knell Further In View Of Olson Or Langford Further In view Of Wang

Independent claim 1 recites "[a] pulse wave Doppler application specific integrated circuit (PW-ASIC) comprising transmit and receive circuitry and a plurality of wave form generation circuits." Independent claim 3 recites "[a]n ultrasound system application specific integrated circuit (US-ASIC) having at least one beam former, a transducer controller, one or more digital signal processor(s), and a plurality of input/output channels"

The Examiner asserts that *Pflugrath* teaches that a plurality of transmit/receive ASICs may be combined into a single ASIC, thereby exhibiting the fundamental recognition that ASICs may themselves be integrated into fewer than their original number, Office Action at page 4. However, the transmit/receive ASIC of *Pflugrath* does not comprise wave form generation circuits, which are located instead in a separate front-end ASIC, column 7, lines 25-33. Similarly, the transmit/receive ASIC of *Pflugrath* does not comprise a digital signal processor, which is instead located in a separate DSP-ASIC. Accordingly, whether a plurality of *Pflugrath* transmit/receive ASICs are combined into a single ASIC or not, the limitations of the claims are not met.

The Examiner further asserts with respect to claim 1 that *Knell* teaches an ASIC-based design which includes “beamformer 12 as well as transmit timing ASIC 14 providing waveform start signals and the receive beamformer processor 18 and Doppler circuitry include dual PW and CW functionality,” stating that this serves as evidence that all the transmit/receive, waveform generation, and PW-CW dual Doppler mode functionalities were contemplated as ASIC-implemented in the prior art, Office Action at page 4. However, *Knell* does not disclose a single ASIC including the functionality expressly set forth in the foregoing claims. Instead, *Knell* teaches “transmit beamformer controller 12 comprises a processor, ASIC, digital signal processor, dedicated hardware, programmable logic device and/or other devices for controlling the transmission of acoustic energy,” “transmit timer 14 comprises a processor, ASIC, digital signal processor, dedicated hardware, programmable logic device and/or other devices for generating the transmit waveforms,” and “beamformer 18 comprises a processor, a digital signal processor, an ASIC, dedicated hardware and/or a programmable logic device,” column 3, lines 33-35 and lines 54-57, and column 4, lines 17-19. Accordingly, *Knell* expressly teaches separate ASICs, along with other discrete components, for each of transmit beamformer 12, transmit timer 14, and beamformer 18. As such, Applicant respectfully asserts that the rejections of record mischaracterize the disclosure of *Knell*.

Moreover, there is nothing in the disclosure of *Knell* relied upon by the Examiner to teach or suggest a PW-ASIC having transmit and receive circuitry and a plurality of wave form generation circuits (claim 1) or a US-ASIC having a beam former, a transducer controller, a digital signal processor, and a plurality of input/output channels (claim 3). Accordingly, there is nothing in the disclosure of *Knell* to meet the express limitations of these claims.

The Examiner appears to concede the foregoing, stating that *Pflugrath* as well as *Knell* “are assumed for purposes of this argument to fall short of suggesting fabrication of a single ASIC for all of the claim 1 recited functions,” Office Action at page 4. However, the Examiner asserts that “it would have been obvious in view of *Olson*, see Face Figure, col. 1 lines 27-58, col. 2 lines 6-11 and col. 16 line 37-col. 17 line 51, to fabricate a generic ASIC covering a severality of functionalities [in their example case the CDU, MAU and MDU

serve as a logic operation set of three functional circuit blocks within the gate array IC (ASIC) 300] in order to lower development and manufacturing costs and achieve volume costs and achieve volume cost benefits of such standardization, and additionally since *Wang* et al cols. 4-5 bridging indicates that the concept of varying degrees of unified integration specifically applies to ASIC implementation designs in this art,” Office Action at pages 4 and 5. Even assuming, *arguendo*, that the foregoing statement was accurate, there is nothing to teach or suggest the combination of circuits in a single ASIC expressly set forth in claims 1 and 3. Accordingly, the rejection of record has not established that *Olson* or *Wang* teach or suggest the limitations of these claims.

Applicant respectfully reminds the Examiner that, to render a claim unpatentable under 35 U.S.C. § 103, all the claim limitations must be taught or suggested by the prior art, M.P.E.P. § 2143.03. As shown above, none of the applied references teach or suggest an ASIC meeting these expressly recited in claims 1 and 3.

The Examiner appears to be relying upon the applied references establishing that some level of further integration of ASIC functions were suggested. However, the level of integration expressly recited in the claims remains to be shown in, or obvious from, the applied art.

Alternatively, the Examiner may be relying on impermissible hindsight in order to piece together the elements of the claims based on knowledge gleaned from Applicants' disclosure, see M.P.E.P. § 2145(X)(A). Applicants assert that, without the teachings of Applicant's disclosure, one of ordinary skill in the art would not have been motivated to modify an ASIC of the applied art to include the circuitry expressly set forth in claims 1 and 3. The prior art must suggest the desirability of the claimed invention, M.P.E.P. § 2143.01. However, none of the applied references detail such desirability.

Moreover, there must be a reasonable expectation of success with respect to the proffered combination. However, it is well known that providing integration of circuitry simultaneously operable in different modes, such as digital and analog, present various challenges and obstacles with respect to noise and degradation of signal and performance. There is nothing in the applied references to suggest to one of ordinary skill in the art that the

particular circuits of the ASICs recited in claims 1 and 3 could be successfully integrated into a single ASIC.

It appears that the Examiner's position is that since *Olson* teaches an ASIC covering several functions, that it would have been obvious to one of ordinary skill in the art reviewing *Pflugrath*, *Knell*, *Olson*, and *Wang* to have combined *Pflugrath*'s transmit/receive ASIC 20, front end ASIC 30, digital signal processing ASIC 40, and back end ASIC 50, see the Office Action at page 5. However, *Olson* teaches that the circuits therein providing the several functions are independent circuit blocks, wherein a mode selection is used to determine which circuit is coupled to the interface pins of the ASIC, see column 2, lines 28-32. Thus only one of the circuits providing the several functions of the ASIC in *Olson* is operable at any time. Accordingly, one of ordinary skill in the art would not have been led to combine the functionality of *Pflugrath*'s transmit/receive ASIC 20, front end ASIC 30, digital signal processing ASIC 40, and back end ASIC 50 from a review of *Olson* because each of the ASICs of *Pflugrath* is used simultaneously (not alternatively) to process a received signal.

Moreover, merely because *Olson* teaches multiple independent circuit blocks implemented in an ASIC does not teach or suggest the combination of circuits expressly recited with respect to the ASIC of claims 1 and 3. The rejection of record sets forth that it is obvious to try all possible arrangements of circuits within an ASIC in order to achieve the specific embodiment recited in Applicants' claim as presented. However, application of an obvious to try rationale in support of an obviousness rejection under 35 U.S.C. § 103 is improper, see M.P.E.P. § 2145(X)(B).

In an alternative rejection over *Pflugrath* in view of *Langford*, the Examiner asserts that *Langford* teaches "that since ASICs improve over VLSI by virtue of combining multiple elemental IC functions in a single device, the tendency towards designing of more complex ASICs as active gates (and pin numbers) increase is performance-driven since the signal shuttle-times in routing through multiple IC chips is then diminished by this functional integration," Office Action at page 5. The foregoing does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because *Langford* has not been shown to teach or suggest the above identified deficiency in the applied art, wherein the particular combination of circuits in a single ASIC set forth in the claim is not present in the art.

Moreover, the Examiner has not provided an objective reason to modify an ASIC of *Pflugrath* to include the specific circuits set forth in claims 1 and 3 in light of *Langford*, see M.P.E.P. 2142.01. The reason provided by the Examiner (to increase the performance of the system) is a general incentive, and not an objective reason. Applicant points out that “[a] general incentive does not make obvious a particular result, nor does the existence of techniques by which those efforts can be carried out.” *In re Deuel*, 51 F.3d 1552, 1559 (Fed. Cir. 1995). Therefore, the motivation provided by the Examiner for combining *Pflugrath* and *Langford* is improper.

As shown above, the 35 U.S.C. § 103 rejections of record with respect to claims 1 and 3 fail to establish a *prima facie* case of obviousness, both by failing to establish that all the claim limitations are met by the art of record and by failing to establish proper motivation for the proffered modifications to the art. Accordingly, claims 1 and 3, and the claims dependent therefrom, are asserted to be patentable over the art of record.

C. The Rejections Over Pflugrath In View of Knell Further In View of Fazioli

Independent claim 2 recites “[a] combined pulse wave and continuous wave Doppler beam former application specific integrated circuit (PC-ASIC).” The Examiner asserts that “given that *Pflugrath* et al incorporate PW Doppler in an ASIC beamformer implementation and *Fazioli* et al acknowledge PW and CW Doppler as equal rank alternatives with particularizations of implementation, provide a CW Doppler ASIC enactment and invite incorporation into various beamformer methodologies, the offering of an ASIC beamformer design capable of both modalities would appear to be an obvious variant,” Office Action at page 6. However, assuming *arguendo* that the Examiner’s statement were correct, the applied art has not been shown to teach or suggest an ASIC having a combined pulse wave and continuous wave Doppler beam former as expressly recited in the claim. As the Examiner states, *Fazioli* teaches PW Doppler and CW Doppler as alternatives, implementing only CW Doppler in the system thereof. There is nothing in the teaching of PW Doppler and CW Doppler as alternatives to teach or suggest to one of ordinary skill in the art to modify *Pflugrath* to include a combined PW Doppler and CW Doppler beam former.

In providing motivation for the proffered modification of *Pflugrath* in view of *Fazioli*, the Examiner states “it would have been obvious in view of *Fazioli* to incorporate a CW ASIC function into *Pflugrath* et al, since the CW processing 300 of *Fazioli* is also ASIC-implemented . . . , is an acknowledged broad equivalent therein . . . , and is stated to be incorporable into beamformer systems of differing methodologies,” Office Action at page 6. The foregoing does not provide motivation for the proffered modification, but rather presents statements as to why it would be possible to modify *Pflugrath* in view of *Fazioli*. However, it is well settled that the fact that references can be combined or modified is not sufficient to establish a *prima facie* case of obviousness, M.P.E.P. § 2143.01. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination, M.P.E.P. § 2143.01 (citing *In re Mills*, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)). Thus, the motivation provided by the Examiner is improper, as the motivation must establish the desirability for making the modification.

The 35 U.S.C. § 103 rejection of record with respect to claim 2 fails to establish a *prima facie* case of obviousness, both by failing to establish that all the claim limitations are met by the art of record and by failing to establish proper motivation for the proffered modifications to the art. Accordingly, claim 2 and the claims dependent therefrom are asserted to be patentable over the art of record.

D. The Rejections Over Pflugrath In View Of Knell Further In View Of Gilling further in view of Olson Or Langford

In rejecting independent claim 3 over *Pflugrath* in view of *Knell* further in view of *Gilling* alone or further in view of *Olson* or *Langford*, the rejection of record appears to rely upon the rejection of claim 3 over *Pflugrath* in view of *Knell* further in view of *Olson* or *Langford* further in view of *Wang*, discussed above, except that the “one or more digital signal processors” is now being read as plural. Applicant has shown above how the claim distinguishes over *Pflugrath* in view of *Knell* further in view of *Olson* or *Langford* further in view of *Wang* and thus will discuss only the addition of *Gilling* with respect to this alternative rejection.

The rejection of record states that “it would have been obvious in view of *Gilling* also directed to a multi-modality (B-mode, Doppler, M-mode) ultrasound beamforming and imaging system to incorporate more DSP architecture into an ASIC-based system since this allows programming flexibility and ease of update as well as lower costs,” Office Action at pages 7 and 8. However, the foregoing does not establish that a single ASIC would include more than one digital signal processor (as opposed to multiple ASICs, each with one digital signal processor).

Moreover, the foregoing statement of motivation does not provided an objective reason to modify an ASIC of *Pflugrath* to include more than one DSP, see M.P.E.P. 2142.01. The reason provided by the Examiner (to allow programming flexibility, ease of update, and lower costs) is a general incentive, and not an objective reason. Applicant points out that “[a] general incentive does not make obvious a particular result, nor does the existence of techniques by which those efforts can be carried out.” *In re Deuel*, 51 F.3d 1552, 1559 (Fed. Cir. 1995). Therefore, the motivation provided by the Examiner for combining *Pflugrath* and *Gilling* is improper.

E. The Dependent Claims

Dependent claims 4-15 are each directly or indirectly dependent from one of the above independent claims. Accordingly, without conceding that the Examiner’s assertions are valid with respect to the limitations of the rejected dependent claims, it is respectfully submitted that the dependent claims are allowable at least for the reasons set forth above with respect to claims 1, 2, and 3.

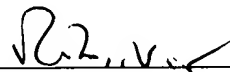
IV. Summary

In view of the above, Applicant believes the pending application is in condition for allowance. Accordingly, Applicant requests that the Examiner pass the case to issue.

Applicant believes that no fee is due with the present Amendment. However, if a fee is due, please charge our Deposit Account No. 06-2380, under Order No. 65744/P011C1/10313161 from which the undersigned is authorized to draw.

Dated: April 3, 2006

Respectfully submitted,

By  _____

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